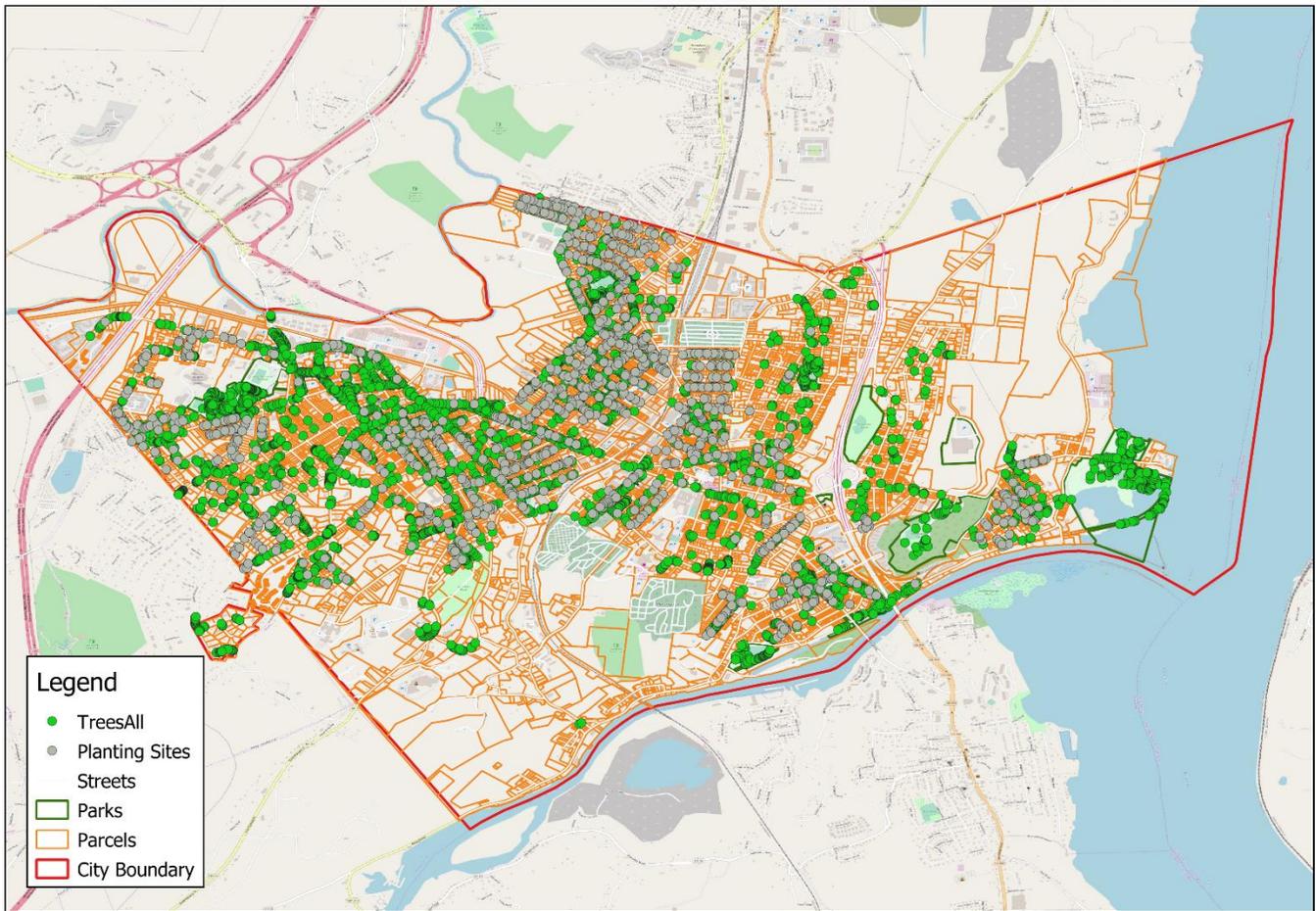


# City of Kingston, NY

## Street Tree Inventory Summary Report

May 17, 2018

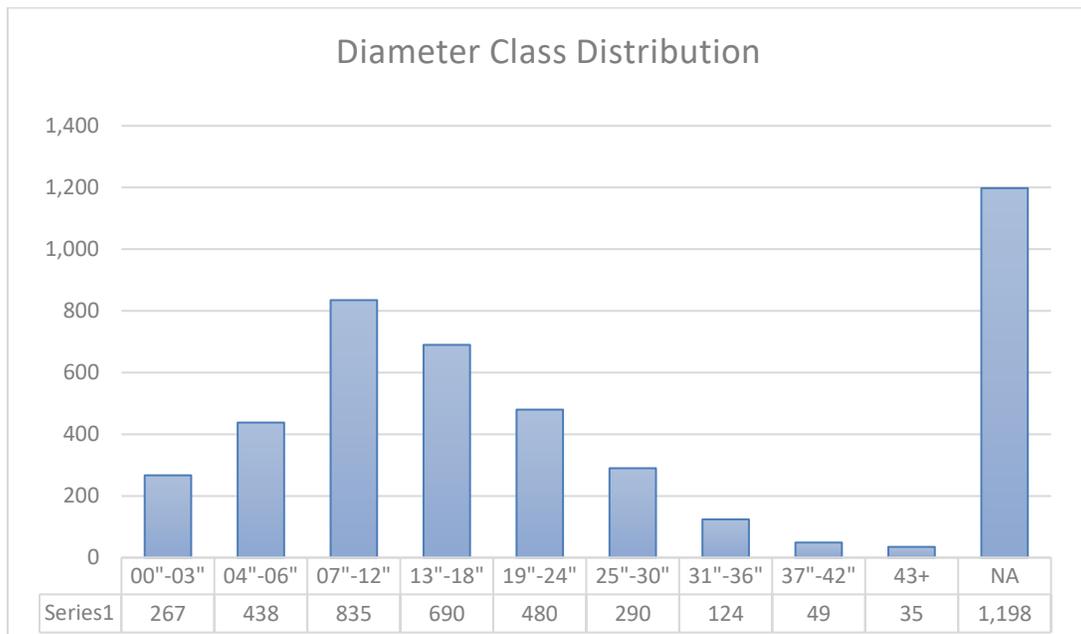


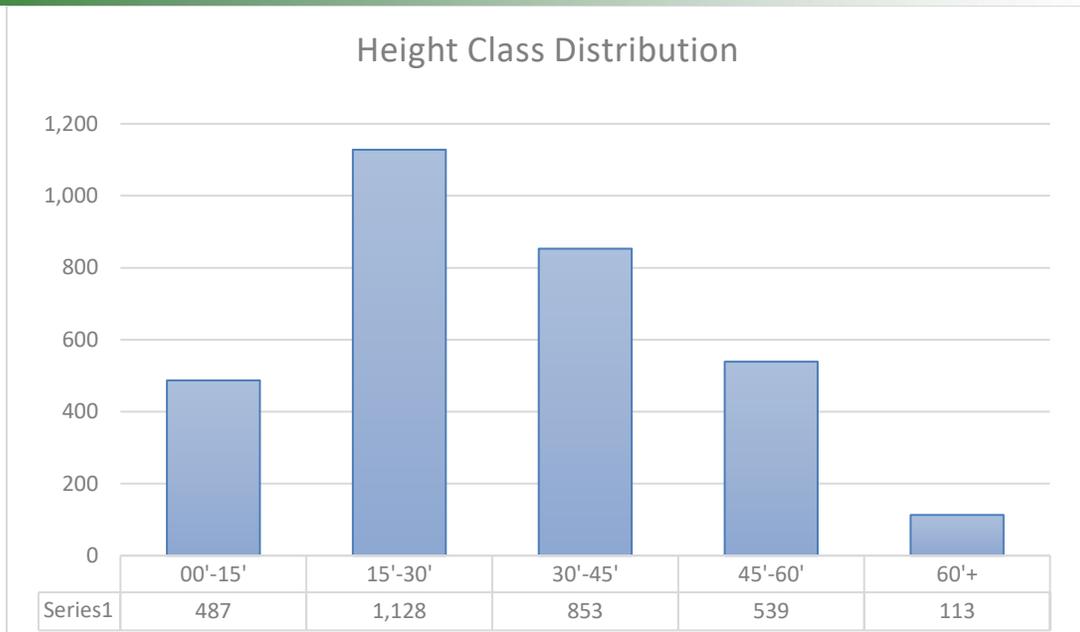
## Report Summary

On April 25, 2018 ArborPro, Inc. began operations on a comprehensive GPS inventory of the trees along street rights-of-way and in public parks in the City of Kingston, NY. ArborPro assigned three ISA Certified Arborists to collect detailed information on the condition, size, species, maintenance recommendations, etc. for all trees owned by the City of Kingston. This summary is a result of the trees collected along city street rights-of-way and includes a total of **4,406 sites**, comprised of 3,119 trees (70.8%), 89 stumps (2.0%), and 1,198 vacant sites (27.2%).

## Size Characteristics

The general size of a tree provides insight into the age and value of the tree as well as the overall age of the urban forest. There are two industry-wide recognized size characteristics, height and diameter at breast height. Diameter at breast height (DBH) is determined by the diameter of the tree at 4.5 feet above grade. DBH range distribution can be used to analyze the relative age distribution of an urban forest. This allows a city to adjust their planting plans to ensure that there are enough young trees to replace aging and over-mature trees. It is important that all age classes are adequately represented throughout the urban forest to ensure a healthy, vibrant tree canopy for future generations.





## Tree Condition

**Good** – The tree has no major structural problems; no significant damage from diseases or pests; no significant mechanical damage; a full, balanced crown, and normal twig condition and vigor for its species.

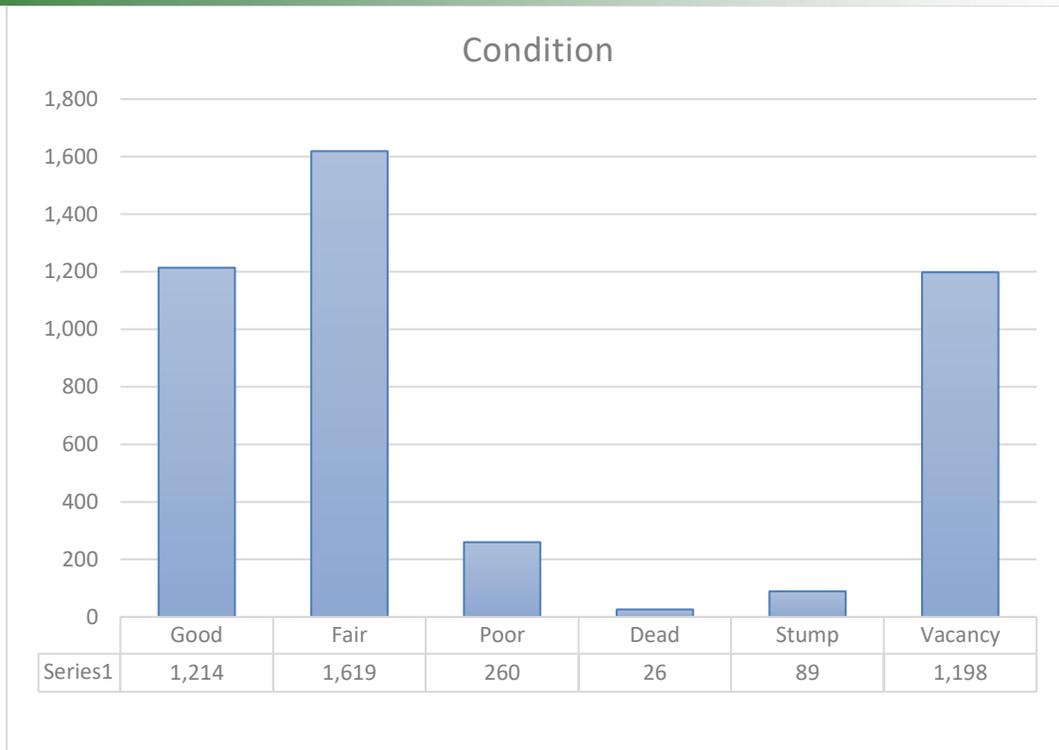
**Fair** – The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage; significant damage from non-fatal or disfiguring diseases; minor crown imbalance or thin crown; minor structural imbalance; or stunted growth compared to adjacent trees.

**Poor** – The tree appears healthy, but may have structural defects. This classification also includes healthy trees that have unbalanced structures or have been topped. Trees in this category may also have severe mechanical damage, decay, severe crown dieback or poor vigor/failure to thrive.

**Critical** – The tree is in a physical state that requires immediate attention. Generally these trees are recommended for a Priority One Removal.

**Dead** – Trees in advanced states of decline are not included. This category refers only to dead trees.

Tree Condition	Tree Count	%
Good	1,214	27.6%
Fair	1,619	36.7%
Poor	260	5.9%
Dead	26	0.6%
Stump	89	2.0%
Vacancy	1,198	27.2%
<b>Total</b>	<b>4,406</b>	



## Recommended Maintenance

**Priority 1 Prune** - Trees that require priority one pruning are recommended for trimming to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs, hazardous deadwood, and dead, dying, or diseased limbs or leaders greater than four inches in diameter.

**Priority 1 Removal** - Trees designated for removal have defects that cannot be cost-effectively or practically treated. The majority of the trees in this category will have a large percentage of dead crown and pose an elevated level of risk for failure. Any hazards that could be seen as potential dangers to persons or property and seen as potential liabilities would be in this category. Large dead and dying trees that are high liability risks are included in this category. These trees are the first ones that should be removed.

**Priority 2 Prune** - These trees have dead, dying, diseased, or weakened branches between two and four inches in diameter and are potential safety hazards.

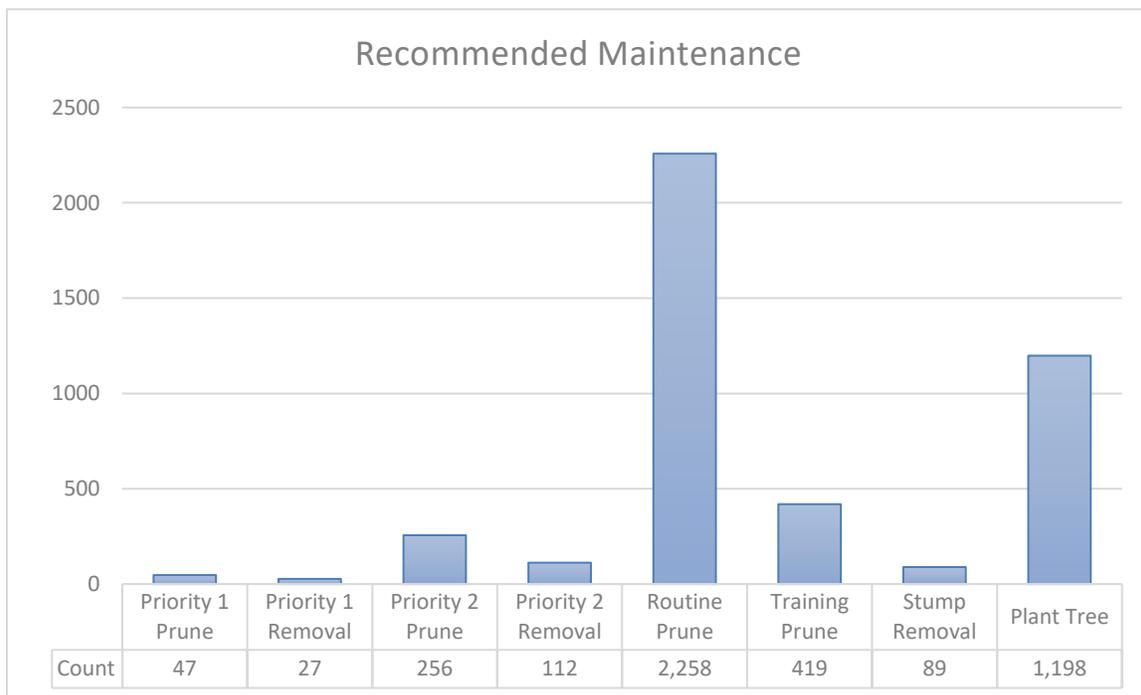
**Priority 2 Removal** - Trees that should be removed but do not pose a liability as great as the first priority will be identified here. This category would need attention as soon as "Priority One" trees are removed.

Maintenance	Tree Count	%
Priority 1 Prune	47	1.1%
Priority 1 Removal	27	0.6%
Priority 2 Prune	256	5.8%
Priority 2 Removal	112	2.5%
Routine Prune	2,258	51.2%
Training Prune	419	9.5%
Stump Removal	89	2.0%
Plant Tree	1,198	27.2%
<b>Total</b>	<b>4,406</b>	

**Routine Prune** - These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings.

**Training Prune** - Young, large-growing trees that are still small must be pruned to correct or eliminate weak, interfering, or objectionable branches in order to minimize future maintenance requirements. These trees, up to 20 feet in height, can be worked with a pole-pruner by a person standing on the ground.

**Stump Removal** - This category indicates a stump that should be removed.



### Vacant Sites

Vacant planting sites were recorded in suitable areas and can be used for future tree plantings. Vacant sites were recorded based on the size of the planting location and the available rooting space. The size of the vacant site is based on the height of a potential tree at maturity. The criteria used to determine size is as follows: Small – 3-4’ of root space, Medium – 5-6’ of root space, 7’ or more of available root space.

Vacant Site Size	Tree Count	%
Vacant planting site - Large	195	16.3%
Vacant planting site - Medium	119	9.9%
Vacant planting site - Small	884	73.8%
<b>Total</b>	<b>1,198</b>	

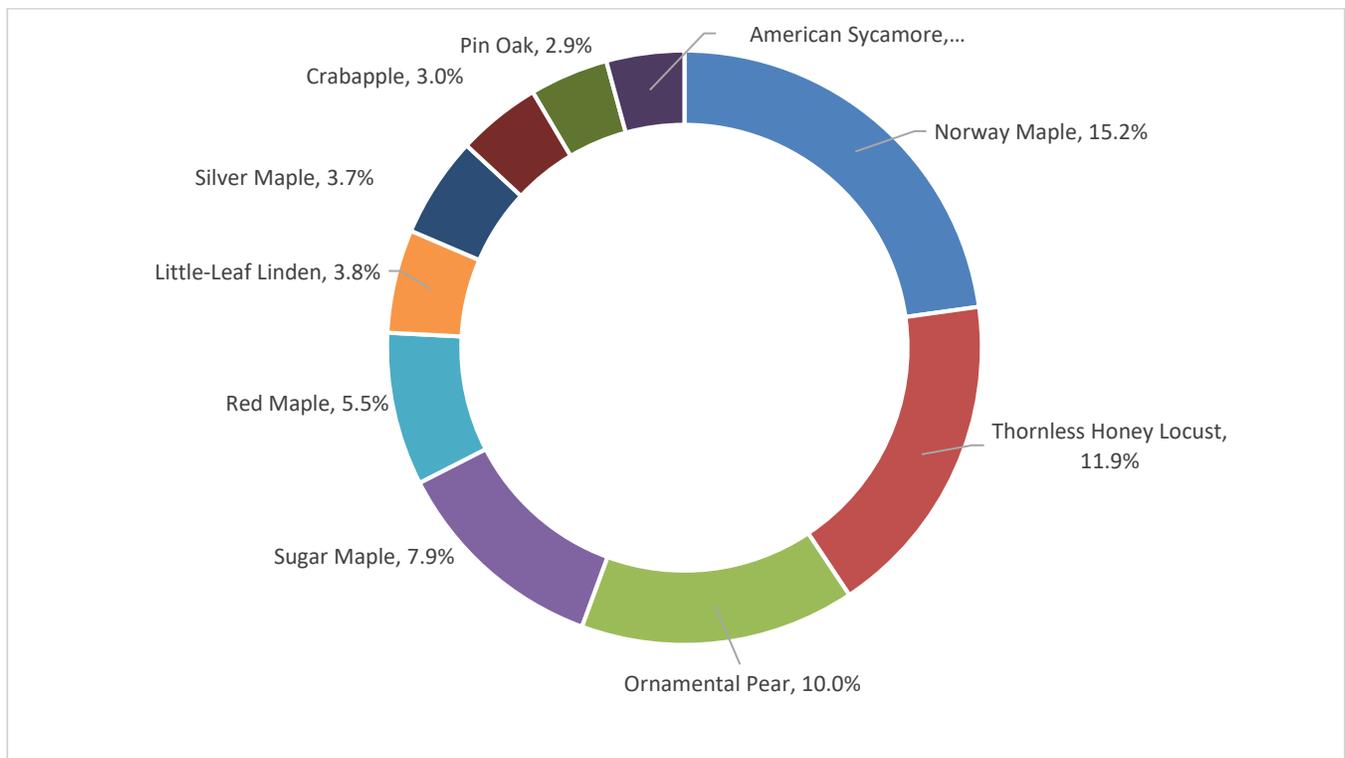
## Hardscape Damage

Hardscape damage was recorded based on the type of material used to construct the sidewalk. Damage was recorded when the vertical lift of the sidewalk was over .5' and could cause a potential tripping hazard.

Hardscape Damage	Tree Count	%
No Damage	3,161	71.7%
Yes - Bluestone	723	16.4%
Yes - Concrete	416	9.4%
Yes - Other	106	2.4%
<b>Total</b>	<b>4,406</b>	

## Species and Distribution

Below are the top 10 species for this delivery.



## Benefits of a Healthy Urban Forest

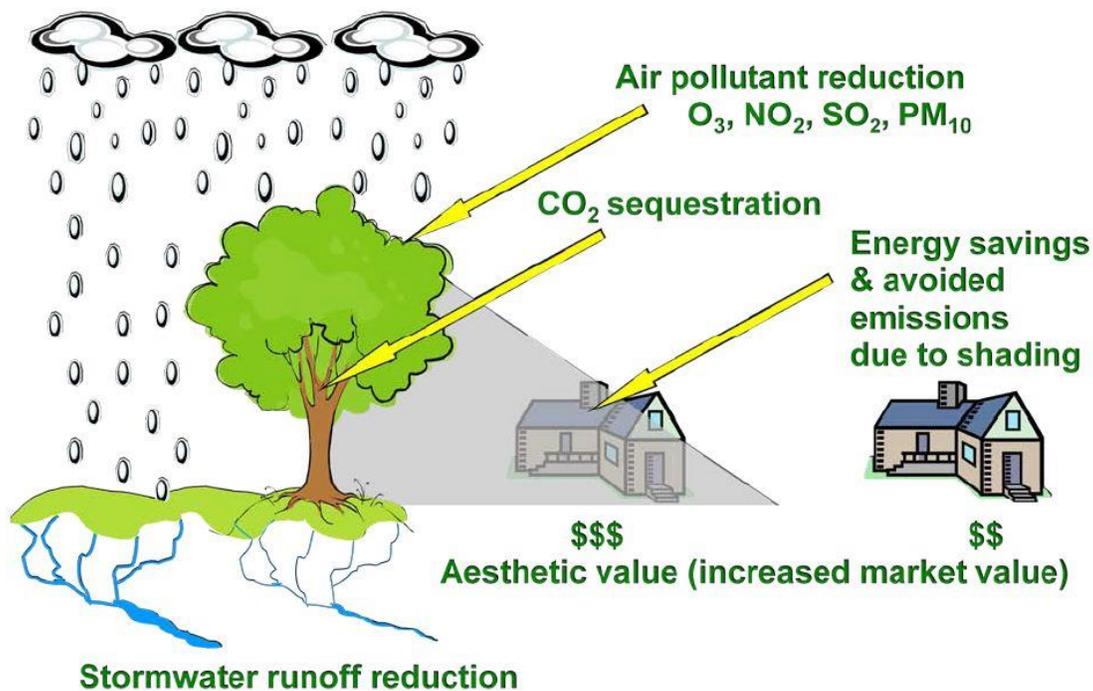
Trees provide a host of environmental, social, and economic benefits in urban areas. When properly maintained, trees can reduce pollution, improve mental health, and lower energy costs. It is important to understand the benefits trees provide as they can offset the cost associated with tree maintenance. A properly implemented tree maintenance program will maximize tree benefits in the urban setting, allowing trees to provide benefits that meet or exceed the time and money invested in maintenance activities.

The i-Tree Streets application was used to quantify the benefits provided by Kingston's trees. This application uses growth and benefit models designed around predominant urban trees to calculate the specific benefits that trees provide in dollar amounts. The benefits calculated by i-Tree Streets include energy conservation, air quality improvements, carbon dioxide (CO<sub>2</sub>) reduction, stormwater control, and aesthetic/other. It creates annual benefit reports that demonstrate the value urban trees provide to the surrounding community.

The trees in Kingston provide a total of **\$426,281 in annual benefits**.

The total replacement cost for all the trees is **\$12,713,819**.

### Ecosystem services provided by urban trees



## Energy Conservation

Public trees contribute to energy conservation by providing shade that reduces cooling costs in the summer and diverting wind to reduce heating costs in the winter. The savings in electricity and natural gas are converted into monetary values to illustrate the annual energy savings that trees provide. Kingston's trees account for a savings of \$181,799 in energy consumption each year.

## Air Quality

Trees improve air quality by removing a number of pollutants from the atmosphere, including ozone, nitrogen dioxide, and particulate matter. The estimated value of pollutants removed by the inventoried tree population each year is \$33,130.

## Carbon Dioxide Sequestration

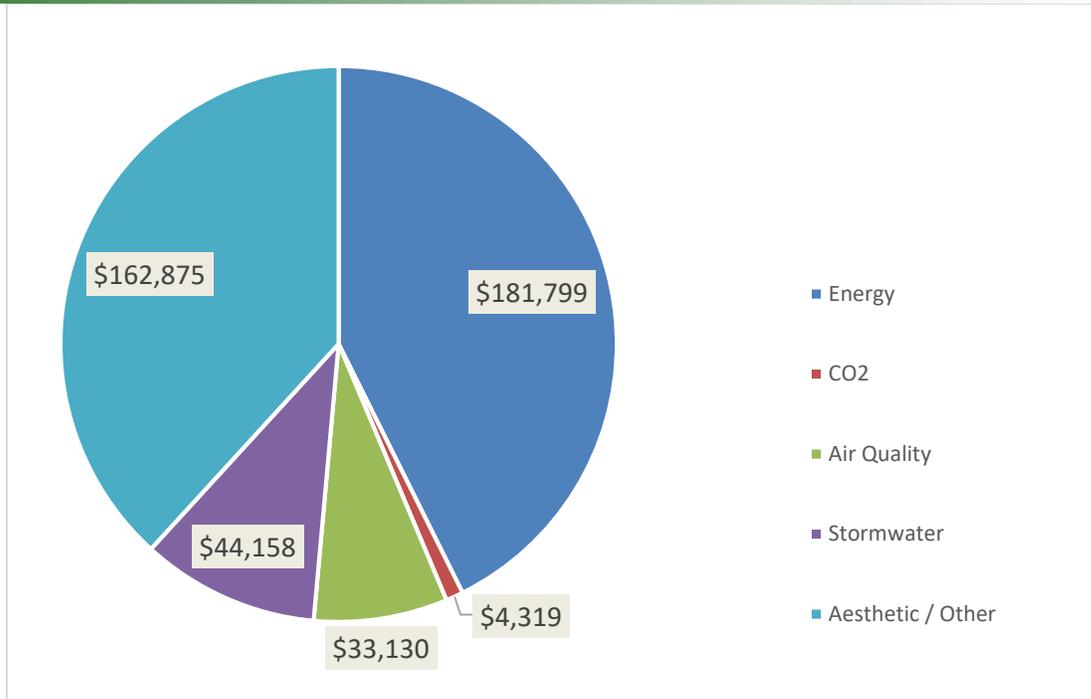
It is well known that trees absorb carbon dioxide and release oxygen into the atmosphere as a product of photosynthesis. Carbon absorbed during this process is ultimately stored in the wood of trees. The amount of carbon sequestered by the inventoried tree population is valued at \$4,319 annually.

## Stormwater Control

Trees reduce the costs associated with diverting stormwater by intercepting rainfall before it hits the ground and enters the storm runoff system. This greatly reduces the strain placed on public stormwater runoff systems and can represent a significant monetary savings by reducing the amount of infrastructure needed to divert stormwater throughout the city. The estimated savings for the City in the management of stormwater runoff is \$44,158 annually.

## Aesthetic/Other

Trees provide many social and economic benefits that are classified as aesthetic/other in the i-Tree Streets application. The major economic benefit in this category is increased property values. Trees contribute to higher property values when compared to similar properties that do not have trees. The major social benefits provided by trees are lower crime rates, improved mental health, greater time spent in businesses with tree lined streets, and higher productivity in the workplace when a view of nature is available. The inventoried trees contribute \$162,875 annually in aesthetic/other benefits.



## Total Replacement Value

In addition to Environmental Benefits, the City can consider the Total Replacement Value for its urban forest. Total Replacement Value is the amount of money it would take to completely replace the existing urban forest with trees of the same size. While this is a scenario that will likely never happen, it gives the City a specific dollar value of its trees in their current state. Replacement value differs from Environmental Benefits in that it shows how much the trees are worth instead of the dollar values that they provide in benefits. For example, a mature sugar maple could provide \$2,100 in environmental benefits by reducing stormwater runoff, improving air quality, etc. but the total cost of replacing an 18” DBH sugar maple would be \$24,270. According to i-Tree Streets, the total replacement cost for the Kingston’s trees is \$12,713,819. The table below shows the breakdown of Replacement Value by Diameter Class.

DBH (inches)	Replacement Value
00"-03"	\$30,705
04"-06"	\$189,603
07"-12"	\$1,107,506
13"-18"	\$2,254,066
19"-24"	\$3,182,124
25"-30"	\$2,786,090
31"-36"	\$1,766,313
37"-42"	\$843,345
43+	\$554,067
<b>Total</b>	<b>\$12,713,819</b>

Below is a Species Frequency report.

Botanical Name	Common Name	Tree Count	%
Abies balsamea	Balsam Fir	1	0.0%
Abies concolor	White Fir	5	0.1%
Acer buergeranum	Trident Maple	4	0.1%
Acer ginnala	Amur Maple	8	0.2%
Acer griseum	Paperbark Maple	6	0.1%
Acer negundo	Box Elder	15	0.3%
Acer negundo 'Flamingo'	Variegated Box Elder	1	0.0%
Acer palmatum	Japanese Maple	36	0.8%
Acer plantanoides	Norway Maple	474	10.8%
Acer rubrum	Red Maple	173	3.9%
Acer saccharinum	Silver Maple	114	2.6%
Acer saccharum	Sugar Maple	247	5.6%
Acer tataricum	Tatarian Maple	1	0.0%
Acer x freemanii	Freeman Maple	3	0.1%
Aesculus hippocastanum	Common Horsechestnut	10	0.2%
Aesculus x carnea	Red Horsechestnut	1	0.0%
Ailanthus altissima	Tree of Heaven	30	0.7%
Albizia julibrissin	Mimosa, Silk Tree	1	0.0%
Amelanchier canadensis	Canadian Serviceberry	22	0.5%
Betula lenta	Sweet Birch	1	0.0%
Betula nigra	River Birch	5	0.1%
Betula papyrifera	Paper Birch	3	0.1%
Betula pendula	European White Birch	1	0.0%
Betula populifolia	Gray Birch	7	0.2%
Carpinus betulus	European Hornbeam	1	0.0%
Carpinus betulus 'Fastigiata'	Upright European Hornbeam	1	0.0%
Carya cordiformis	Bitternut Hickory	8	0.2%
Carya ovata	Shagbark Hickory	3	0.1%
Catalpa speciosa	Western Catalpa	30	0.7%
Celtis occidentalis	Common Hackberry	7	0.2%
Cercidiphyllum japonicum	Katsura Tree	2	0.0%
Cercis canadensis	Eastern Redbud	7	0.2%
Cornus florida	Eastern Dogwood	29	0.7%
Crataegus crus-galli	Cockspur Thorn	10	0.2%
Crataegus crus-galli inermis	Thornless Hawthorn	9	0.2%
Diospyros virginiana	American Persimmon	1	0.0%
Fagus sylvatica 'Fastigiata'	Upright European Beech	3	0.1%
Fraxinus americana	White Ash	11	0.2%

Fraxinus pennsylvanica	Green Ash	25	0.6%
Ginkgo biloba	Maidenhair Tree	59	1.3%
Gleditsia triacanthos forma inermis	Thornless Honey Locust	371	8.4%
Juglans cinerea	Butternut	1	0.0%
Juglans nigra	Black Walnut	15	0.3%
Juglans regia	English Walnut	1	0.0%
Juniperus virginiana	Eastern Red Cedar	23	0.5%
Koelreuteria paniculata	Goldenrain Tree	1	0.0%
Liquidambar styraciflua 'Rotundiloba'	Round-Leafed Sweet Gum	1	0.0%
Liriodendron tulipifera	Tulip Tree	7	0.2%
Maackia amurensis	Manchurian Maackia	4	0.1%
Magnolia stellata	Star Magnolia	2	0.0%
Magnolia x soulangiana	Saucer Magnolia	7	0.2%
Malus domestica	Edible Apple Species	3	0.1%
Malus floribunda	Crabapple	95	2.2%
Metasequoia glyptostroboides	Dawn Redwood	1	0.0%
Morus alba	White Mulberry	25	0.6%
Ostrya virginiana	American Hophornbeam	2	0.0%
Picea abies	Norway Spruce	13	0.3%
Picea glauca	White Spruce	18	0.4%
Picea glauca albertiana	Alberta Spruce	2	0.0%
Picea pungens	Colorado Spruce	55	1.2%
Pinus mugo mugo	Mugho Pine	1	0.0%
Pinus nigra	Austrian Black Pine	3	0.1%
Pinus strobus	White Pine	41	0.9%
Pinus sylvestris	Scotch Pine	1	0.0%
Platanus occidentalis	American Sycamore	88	2.0%
Populus deltoides	Cottonwood	10	0.2%
Populus tremuloides	Quaking Aspen	1	0.0%
Prunus avium	Sweet Cherry	1	0.0%
Prunus cerasifera	Purple-Leaf Plum	17	0.4%
Prunus domestica	Plum	1	0.0%
Prunus persica	Peach	8	0.2%
Prunus serotina	Eastern Black Cherry	15	0.3%
Prunus serrulata	Japanese Flowering Cherry	36	0.8%
Prunus serrulata 'Kwanzan'	'Kwanzan' Flowering Cherry	1	0.0%
Prunus species	Stone Fruit species	4	0.1%
Prunus subhirtella 'Pendula'	Weeping Flowering Cherry	7	0.2%
Pyrus calleryana	Ornamental Pear	311	7.1%
Pyrus communis	Edible Pear	5	0.1%
Quercus alba	White Oak	1	0.0%

Quercus imbricaria	Shingle Oak	4	0.1%
Quercus macrocarpa	Bur Oak	3	0.1%
Quercus palustris	Pin Oak	89	2.0%
Quercus phellos	Willow Oak	2	0.0%
Quercus robur 'Fastigiata'	Upright English Oak	2	0.0%
Quercus rubra	Red Oak	19	0.4%
Quercus velutina	Black Oak	1	0.0%
Rhamnus cathartica	Common Buckthorn	6	0.1%
Robinia pseudoacacia	Black Locust	76	1.7%
Salix babylonica	Weeping Willow	3	0.1%
Salix integra	Dappled Willow	1	0.0%
Salix matsudana 'Tortuosa'	Corkscrew Willow	1	0.0%
Sassafras albidum	Sassafras	1	0.0%
Stump	Stump	89	2.0%
Styphnolobium japonicum	Japanese Pagoda Tree	2	0.0%
Syringa reticulata	Japanese Tree Lilac	21	0.5%
Syringa vulgaris	Common Lilac	4	0.1%
Taxus spp.	Yew Species	6	0.1%
Thuja occidentalis	American Arborvitae	36	0.8%
Tilia americana	American Linden	6	0.1%
Tilia cordata	Little-Leaf Linden	117	2.7%
Tsuga canadensis	Eastern Hemlock	80	1.8%
Ulmus americana	American Elm	6	0.1%
Ulmus parvifolia	Chinese Elm	6	0.1%
Ulmus pumila	Siberian Elm	43	1.0%
Ulmus x species	Hybrid Elm	10	0.2%
Vacant planting site - Large	Vacant planting site - Large	195	4.4%
Vacant planting site - Medium	Vacant planting site - Medium	119	2.7%
Vacant planting site - Small	Vacant planting site - Small	884	20.1%